

AKI

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1. Comorbidities, acute kidney injury and long-term mortality in elderly patients hospitalized because of hip fracture: a moderation analysis.

Authors: Borges de Sa, Saulo Lacerda;Faria, Maria Luiza Medeiros;Goncalves, Tiago Lins Oliveira and Liborio, Alexandre Braga

Publication Date: May 30 ,2024

Journal: Aging-Clinical & Experimental Research 36(1), pp. 123

Abstract: INTRODUCTION: Femoral fractures in elderly individuals present significant health challenges, often leading to increased morbidity and mortality. Acute kidney injury (AKI) during hospitalization further complicates outcomes, yet the interaction between AKI severity and comorbidities, as quantified by the Charlson Comorbidity Index (CCI), remains poorly understood in this population. This study aimed to assess the associations between AKI severity and the CCI and between AKI severity and one-year mortality postfemoral fracture in elderly patients. METHODOLOGY: This study utilized data from the Multiparameter Intelligent Monitoring in Intensive Care (MIMIC-IV) database and focused on elderly patients (> 65 years) admitted with hip fractures. Patients were categorized based on AKI stage according to the KDIGO criteria and CCI scores. The primary outcome assessed was all-cause mortality one year after hospital discharge. The statistical analyses included logistic regression, Cox proportional hazards regression and moderation analysis with the Johnson-Neyman technique to evaluate associations between AKI and long-term mortality and between the CCI and long-term mortality. RESULTS: The analysis included 1,955 patients and revealed that severe AKI (stages 2 and 3) was independently associated with increased one-year mortality. Notably, the CCI moderated these associations significantly. A lower CCI score was significantly correlated with greater mortality in patients with severe AKI. The impact of severe AKI was greater for those with a CCI as low as 3, more than doubling the observed one-year mortality rate. In contrast, higher CCI scores (≥ 8) did not significantly impact mortality. Sensitivity analyses supported these findings, underscoring the robustness of the observed associations. CONCLUSION: This study elucidates the complex interplay between AKI severity and comorbidities and long-term mortality in elderly hip fracture patients. These findings underscore the importance of considering both AKI severity and comorbidity burden in prognostic assessments and intervention strategies for this vulnerable population. Targeted interventions tailored to individual risk profiles may help mitigate the impact of AKI on mortality outcomes, ultimately improving patient care and outcomes. Further research is warranted to explore the underlying mechanisms involved and refine risk stratification approaches in this population. Copyright © 2024. The Author(s).

2. Positive pathogens in stool could predict the clinical outcomes of sepsis-associated acute kidney injury in critical ill patient.

Authors: Cao, Y. and Deng, F.

Publication Date: 2024

Journal: Scientific Reports 14(1), pp. 11227

Abstract: In this study, we sought to evaluate the influence of positive pathogens in stool (PPS) on clinical outcomes in critical ill patients with Sepsis-associated acute kidney injury (S-AKI) from intensive care unit. Our sample consisted of 7338 patients, of whom 752 (10.25%) had PPS. We found that the presence of *Clostridium difficile* (*C. difficile*) and protists in stool samples was correlated with survival during hospitalization, as well as 30-day and 90-day survival. Interestingly, there was no significant difference in overall survival and 30-day in-hospital survival between the PPS group and the negative pathogens in stool (NPS) control group. However, the cumulative incidence of 90-day infection-related mortality was significantly higher in the PPS group (53 vs. 48%, $P=0.022$), particularly in patients with *C. difficile* in their stool specimens. After adjusting for propensity scores, the results also have statistical significance. These findings suggest that PPS may affect the 90-days survival outcomes of S-AKI, particularly in patients with *C. difficile* and protists in their stool samples. Further research is warranted

to further explore these associations. Copyright © 2024. The Author(s).

3. Clinical epidemiology and outcomes of emergency department-acute kidney injury: A systematic review.

Authors: Cheung, Tsz Yan; Lam, Kelvin; Leung, Siu Chung and Rainer, Timothy H.

Publication Date: May 15, 2024

Journal: Heliyon 10(9), pp. e30580

Abstract: Background: Over half of all community-acquired acute kidney injury (CA-AKI) initially presented to emergency department (ED), but emergency department acute kidney injury (ED-AKI) is poorly characterised, poorly understood with no systematic review, often under-recognized and under-managed. Objective: To review the incidence, risk factors, and outcomes of ED-AKI, and risk factors of post-ED-AKI mortality globally. Methods: We included published prospective or retrospective observational studies, controlled trials, and systematic reviews reporting AKI in adult ED attendees within 24 h of ED admission. Iatrogenic causes of AKI from medical interventions were excluded. We used PubMed to identify articles from 1996 to August 14, 2021, and adopted the National Heart, Lung, and Blood Institute (NHLBI) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies to assess risk of bias. We used a Forest plot to present pooled ED-AKI incidence rates and I² statistics. Other parameters were summarized narratively. Results: Using 24 h from ED admission as the definition for ED-AKI we identified six articles from 2005 to 2018 in high-income settings and one article with a 48-h timeframe. The pooled incidence of ED-AKI was 20 per 1000 adult ED attendances. Risk factors for ED-AKI included increasing age, nursing home residence, previous hospital admission within 30 days, discharge diagnosis of diabetes, obstructive uropathy, sepsis, gastrointestinal medical conditions, high serum creatinine, bilirubin, C-reactive protein, white blood cell, alanine aminotransferase, low serum sodium or albumin on admission, poor pre-morbid renal function, antibiotic use, active malignancy, lung disease, hyperlipidaemia, and infection. Crude, all-cause 24-h mortality rate was 4.56 % and the one-year mortality rate was 35.04 %. Increasing age and comorbidities including cardiovascular disease and malignancy were associated with higher mortality rates. Conclusion: The review reveals a paucity of relevant literature which calls for further research, increased vigilance, red flag identification, and standardized management protocols for ED-AKI. Copyright © 2024 The Authors.

4. Kidney Doppler Ultrasonography in Critical Care Nephrology.

Authors: Corradi, F.; Bell, M. and De Rosa, S.

Publication Date: 2024

Journal: Nephrology, Dialysis, Transplantation : Official Publication of the European Dialysis and Transplant Association - European Renal Association (pagination), pp. Date of Publication: 02 May 2024

Abstract: Color pulsed-wave Doppler ultrasound (CPWD-US) emerges as a pivotal tool in intensive care units (ICUs) for diagnosing acute kidney injury (AKI) swiftly and non-invasively. Its bedside accessibility allows for rapid assessments, making it a primary imaging modality for AKI characterization. Furthermore, CPWD-US serves as a guiding instrument for key diagnostic-interventional procedures such as renal needle biopsy and percutaneous nephrostomy, while also facilitating therapy response monitoring and AKI progression tracking. This review shifts focus towards the integration of renal ultrasound into ICU workflows, offering contemporary insights into its utilization through a diagnostic-standard-oriented approach. By presenting a flow chart, this review aims to provide practical guidance on the appropriate use of point-of-care ultrasound (POC-US) in critical care scenarios, enhancing diagnostic precision, patient management, and safety, albeit amidst a backdrop of limited evidence regarding long-term outcomes. Copyright © The Author(s) 2024. Published by Oxford University Press on behalf of the ERA.

5. Acute kidney injury in nonagenarians: clinical characteristics and mortality.

Authors: Dias, Rafael Peixoto Lima;Duarte, Daniella Bezerra;Barbosa, Danilo de Castro Bulhoes Mascarenhas and Campos, Rodrigo Peixoto

Publication Date: 2024

Journal: Jornal Brasileiro De Nefrologia 46(3), pp. e20230088

Abstract: INTRODUCTION: Nonagenarians constitute a rising percentage of inpatients, with acute kidney injury (AKI) being frequent in this population. Thus, it is important to analyze the clinical characteristics of this demographic and their impact on mortality. METHODS: Retrospective study of nonagenarian patients with AKI at a tertiary hospital between 2013 and 2022. Only the latest hospital admission was considered, and patients with incomplete data were excluded. A logistic regression analysis was conducted to define risk factors for mortality. A p-value : Retrospective study of nonagenarian patients with AKI at a tertiary hospital between 2013 and 2022. Only the latest hospital admission was considered, and patients with incomplete data were excluded. A logistic regression analysis was conducted to define risk factors for mortality. A p-value RESULTS: A total of 150 patients were included, with a median age of 93.0 years (91.2-95.0), and males accounting for 42.7% of the sample. Sepsis was the most common cause of AKI (53.3%), followed by dehydration/hypovolemia (17.7%), and heart failure (17.7%). ICU admission occurred in 39.3% of patients, mechanical ventilation in 14.7%, vasopressors use in 22.7% and renal replacement therapy (RRT) in 6.7%. Death occurred in 56.7% of patients. Dehydration/hypovolemia as an etiology of AKI was associated with a lower risk of mortality (OR 0.18; 95% CI 0.04-0.77, p = 0.020). KDIGO stage 3 (OR 3.15; 95% CI 1.17-8.47, p = 0.023), ICU admission (OR 12.27; 95% CI 3.03-49.74, p : A total of 150 patients were included, with a median age of 93.0 years (91.2-95.0), and males accounting for 42.7% of the sample. Sepsis was the most common cause of AKI (53.3%), followed by dehydration/hypovolemia (17.7%), and heart failure (17.7%). ICU admission occurred in 39.3% of patients, mechanical ventilation in 14.7%, vasopressors use in 22.7% and renal replacement therapy (RRT) in 6.7%. Death occurred in 56.7% of patients. Dehydration/hypovolemia as an etiology of AKI was associated with a lower risk of mortality (OR 0.18; 95% CI 0.04-0.77, p = 0.020). KDIGO stage 3 (OR 3.15; 95% CI 1.17-8.47, p = 0.023), ICU admission (OR 12.27; 95% CI 3.03-49.74, p CONCLUSION: AKI nonagenarians had a high mortality rate, with AKI KDIGO stage 3, oliguria, and ICU admission being associated with death.

6. Development and validation of a machine-learning model for predicting the risk of death in sepsis patients with acute kidney injury.

Authors: Dong, Lei;Liu, Pei;Qi, Zhili;Lin, Jin and Duan, Meili

Publication Date: May 15 ,2024

Journal: Heliyon 10(9), pp. e29985

Abstract: The mortality rate of patients with sepsis-induced acute kidney injury (S-AKI) is notably elevated. The initial categorization of prognostic indicators has a beneficial impact on elucidating and enhancing disease outcomes. This study aimed to predict the mortality risk of S-AKI patients by employing machine learning techniques. The sample size determined by a four-step procedure yielded 1508 samples. The research design necessitated the inclusion of individuals with S-AKI from the Medical Information Mart for Intensive Care (MIMIC)-IV database. The patients were initially admitted to the Intensive Care Unit (ICU) for their hospital stay. Additionally, these patients (aged from 18 to 89 years old) had encountered S-AKI on the day of their admittance. Forty-two predictive factors were analyzed, with hospitalization death as the outcome variable. The training set (4001 cases) consisted of 70 % of the participants, and the remaining (1714 cases) participants were allocated to the validation set. Furthermore, an additional validation set (MIMIC-III) consisted of 1757 patients from the MIMIC-III database. Moreover, an external validation set from the Intensive Care Department of Beijing Friendship Hospital (BFH) comprised 72 patients. Six machine learning models were employed in the

prediction, namely the logistic, lasso, rpart, random forest, xgboost, and artificial neural network models. The comparative efficacy of the newly developed model in relation to the APACHE II model for predicting mortality risk was also assessed. The XGBoost model exhibited a superior performance with the training set. With the internal validation set and the two external validation sets (MIMIC-III and BFH), the xgboost algorithm demonstrated the highest performance. Meanwhile, APACHE II performed poorly at predicting the mortality risk with the BFH validation set. The mortality risk was influenced by three primary clinical parameters: urine volume, lactate, and Glasgow Coma Scale (GCS) score. Thus, we developed a prediction model for the risk of death among S-AKI patients that has an improved performance compared to previous models and is a potentially valuable tool for S-AKI prediction and treatment in the clinic. Copyright © 2024 The Authors.

7. Impact of severe acute kidney injury on short-term mortality in urosepsis.

Authors: Fujita, N.;Momota, M.;Soma, O.;Noro, D.;Mikami, J.;Miura, Y.;Ito, H.;Yoneyama, T.;Hashimoto, Y.;Yoshikawa, K.;Ohyama, C. and Hatakeyama, S.

Publication Date: 2024

Journal: World Journal of Urology 42(1), pp. 301

Abstract: PURPOSE: To evaluate the impact of severe acute kidney injury (AKI) on short-term mortality in patients with urosepsis. METHOD(S): This prospective cohort study evaluated 207 patients with urosepsis. AKI was diagnosed in accordance with the Kidney Disease Improving Global Outcomes criteria, and severe AKI was defined as stage 2 or 3 AKI. Patients were divided into two groups: patients who developed severe AKI (severe AKI group) and patients who did not (control group). The primary endpoint was all-cause mortality within 30 days. The secondary endpoints were 90-day mortality and in-hospital mortality. The exploratory outcomes were the risk factors for severe AKI development. RESULT(S): The median patient age was 79 years. Of the 207 patients, 56 (27%) developed severe AKI. The 30-day mortality rate in the severe AKI group was significantly higher than that in the control group (20% vs. 2.0%, respectively; PRESULT(S): The median patient age was 79 years. Of the 207 patients, 56 (27%) developed severe AKI. The 30-day mortality rate in the severe AKI group was significantly higher than that in the control group (20% vs. 2.0%, respectively; PRESULT(S): The median patient age was 79 years. Of the 207 patients, 56 (27%) developed severe AKI. The 30-day mortality rate in the severe AKI group was significantly higher than that in the control group (20% vs. 2.0%, respectively; PCONCLUSION(S): Severe AKI was a common complication in patients with urosepsis and contributed to high short-term mortality rates. Copyright © 2024. The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature.

8. Long-term outcome of COVID-19 patients with acute kidney injury requiring kidney replacement therapy.

Authors: Godi, Ilaria;Pasin, Laura;Ballin, Andrea;Martelli, Gabriele;Bonanno, Claudio;Terranova, Francesco;Tamburini, Enrico;Simoni, Caterina;Randon, Ginevra;Franchetti, Nicola;Cattarin, Leda;Nalesso, Federico;Calo, Lorenzo and Tiberio, Ivo

Publication Date: May 09 ,2024

Journal: Journal of Anesthesia, Analgesia and Critical Care (Online) 4(1), pp. 32

Abstract: BACKGROUND: Limited data existed on the burden of coronavirus disease 2019 (COVID-19) renal complications and the outcomes of the most critical patients who required kidney replacement therapy (KRT) during intensive care unit (ICU) stay. We aimed to describe mortality and renal function at 90 days in patients admitted for COVID-19 and KRT. METHODS: A retrospective cohort study of critically ill patients admitted for COVID-19 and requiring KRT from March 2020 to January 2022 was

conducted in an Italian ICU from a tertiary care hospital. Primary outcome was mortality at 90 days and secondary outcome was kidney function at 90 days. RESULTS: A cohort of 45 patients was analyzed. Mortality was 60% during ICU stay and increased from 64% at the time of hospital discharge to 71% at 90 days. Among 90-day survivors, 31% required dialysis, 38% recovered incompletely, and 31% completely recovered renal function. The probability of being alive and dialysis-free at 3 months was 22%. CONCLUSIONS: Critically ill patients with COVID-19 disease requiring KRT during ICU stay had elevated mortality rate at 90 days, with low probability of being alive and dialysis-free at 3 months. However, a non-negligible number of patients completely recovered renal function. Copyright © 2024. The Author(s).

9. Interleukin-6 as a prognostic marker in acute renal injury and its klotho-dependent regulation.

Authors: GonzalezLafuente, L.;MercadoGarcia, E.;VazquezSanchez, S.;GonzalezMoreno, D.;Bosca, L.;FernandezVelasco, M.;Segura, J.;KuroO, M.;Ruilope, L. M.;Liano, F. and RuizHurtado, G.

Publication Date: 2024

Journal: Nefrologia (pagination), pp. Date of Publication: 2024

Abstract: Background and objective: In acute kidney injury (AKI), a strong inflammatory component is activated in response to the renal damage, and one of the main mediators behind this process is the pro-inflammatory interleukin 6 or IL-6. Beside to this phenomenon, there are also alterations in different components of mineral metabolism, such as those dependent on fibroblast growth factor (FGF)23 and the anti-ageing cofactor klotho. The aim of this work was to explore the association between renal function and systemic levels of IL-6, as well as FGF23 and klotho in the early stages of AKI, analysing the predictive capacity of IL-6 in early mortality associated with AKI. Material(s) and Method(s): Plasma levels of IL-6, klotho and FGF23 were analysed in samples from 28 patients with AKI and related to renal function on hospital admission, and after 24 and 72 hours. In addition, the predictive capacity of IL-6 on AKI-associated mortality was analysed at the three study time points. In an experimental nephrotoxic -AKI mouse model, systemic IL-6 and FGF23 values were also analysed 24 and 72 hours after induction of kidney damage, as well as in mice overexpressing the anti-ageing protein, klotho. Result(s): Systemic IL-6 levels increased in AKI patients, especially in hospital admission time, and decreased in parallel with improving renal function. At the same time as IL-6 values increased, there was an increase in FGF23 and a decrease in klotho levels, with a significant and positive correlation between IL-6 and FGF23 levels. In addition, we obtained that systemic IL-6 levels were a good predictor of mortality in these patients, with an area under the curve equal to one at 72 hours after AKI. In the experimental mouse AKI model, we also observed an increase in plasma levels in both IL-6 and FGF23 after 24 hours of kidney damage. Nevertheless, in transgenic mice overexpressing klotho, there was no such increase in any of them. Conclusion(s): There is an association between renal damage and increased levels of IL-6 and FGF23 in patients with AKI, especially on hospital admission time. Moreover, IL-6 levels are able to predict mortality in these patients, being a promising prognostic biomarker at any study time with a strong prediction at 72 hours after patient admission. Maintaining adequate klotho levels could prevent the IL-6 mediated inflammatory response and therefore also reduce the degree and severity of renal damage after AKI. Copyright © 2024 Sociedad Espanola de Nefrologia

10. Megalin-related mechanism of hemolysis-induced acute kidney injury and the therapeutic strategy.

Authors: Goto, Sawako;Hosojima, Michihiro;Kabasawa, Hideyuki;Arai, Kaho;Takemoto, Kazuya;Aoki, Hiroyuki;Komochi, Koichi;Kobayashi, Ryota;Sugita, Nanako;Endo, Taeko;Kaseda, Ryohei;Yoshida, Yutaka;Narita, Ichiei;Hirayama, Yoshiaki and Saito, Akihiko

Publication Date: Jul ,2024

Journal: Journal of Pathology 263(3), pp. 315-327

Abstract: Hemolysis-induced acute kidney injury (AKI) is attributed to heme-mediated proximal tubule epithelial cell (PTEC) injury and tubular cast formation due to intratubular protein condensation. Megalin is a multiligand endocytic receptor for proteins, peptides, and drugs in PTECs and mediates the uptake of free hemoglobin and the heme-scavenging protein alpha1-microglobulin. However, understanding of how megalin is involved in the development of hemolysis-induced AKI remains elusive. Here, we investigated the megalin-related pathogenesis of hemolysis-induced AKI and a therapeutic strategy using cilastatin, a megalin blocker. A phenylhydrazine-induced hemolysis model developed in kidney-specific mosaic megalin knockout (MegKO) mice confirmed megalin-dependent PTEC injury revealed by the co-expression of kidney injury molecule-1 (KIM-1). In the hemolysis model in kidney-specific conditional MegKO mice, the uptake of hemoglobin and alpha1-microglobulin as well as KIM-1 expression in PTECs was suppressed, but tubular cast formation was augmented, likely due to the nonselective inhibition of protein reabsorption in PTECs. Quartz crystal microbalance analysis revealed that cilastatin suppressed the binding of megalin with hemoglobin and alpha1-microglobulin. Cilastatin also inhibited the specific uptake of fluorescent hemoglobin by megalin-expressing rat yolk sac tumor-derived L2 cells. In a mouse model of hemolysis-induced AKI, repeated cilastatin administration suppressed PTEC injury by inhibiting the uptake of hemoglobin and alpha1-microglobulin and also prevented cast formation. Hemopexin, another heme-scavenging protein, was also found to be a novel ligand of megalin, and its binding to megalin and uptake by PTECs in the hemolysis model were suppressed by cilastatin. Mass spectrometry-based semiquantitative analysis of urinary proteins in cilastatin-treated C57BL/6J mice indicated that cilastatin suppressed the reabsorption of a limited number of megalin ligands in PTECs, including alpha1-microglobulin and hemopexin. Collectively, cilastatin-mediated selective megalin blockade is an effective therapeutic strategy to prevent both heme-mediated PTEC injury and cast formation in hemolysis-induced AKI. © 2024 The Pathological Society of Great Britain and Ireland. Copyright © 2024 The Pathological Society of Great Britain and Ireland.

11. Blood Pressure, Readmission, and Mortality Among Patients Hospitalized With Acute Kidney Injury.

Authors: Griffin, Benjamin R.;Vaughan-Sarrazin, Mary;Shi, Qianyi;Ten Eyck, Patrick;Reisinger, Heather S.;Kennelty, Korey;Good, Mary K.;Swee, Melissa L.;Yamada, Masaaki;Lund, Brian C. and Jalal, Diana I.

Publication Date: May 01 ,2024

Journal: JAMA Network Open 7(5), pp. e2410824

Abstract: Importance: Acute kidney injury (AKI) complicates 20% to 25% of hospital admissions and is associated with long-term mortality, especially from cardiovascular disease. Lower systolic blood pressure (SBP) following AKI may be associated with lower mortality, but potentially at the cost of higher short-term complications. Objective: To determine associations of SBP with mortality and hospital readmissions following AKI, and to determine whether time from discharge affects these associations. Design, Setting, and Participants: This retrospective cohort study of adults with AKI during a hospitalization in Veteran Healthcare Association (VHA) hospitals was conducted between January 2013 and December 2018. Patients with 1 year or less of data within the VA system prior to admission, severe or end-stage liver disease, stage 4 or 5 chronic kidney disease, end-stage kidney disease, metastatic cancer, and no blood pressure values within 30 days of discharge were excluded. Data analysis was conducted from May 2022 to February 2024. Exposure: SBP was treated as time-dependent (categorized as ≤ 160 mm Hg [comparator]). Time spent in each SBP category was accumulated over time and represented in 30-day increments. Main Outcomes and Measures: Primary outcomes were time to mortality and time to all-cause hospital readmission. Cox proportional hazards regression was adjusted for demographics, comorbidities, and laboratory values. To evaluate associations over time, hazard ratios (HRs) were calculated at 60 days, 90 days, 120 days, 180 days, 270 days, and 365 days from discharge. Results: Of 237409 admissions with AKI, 80960 (57242 aged 65 years or older [70.7%]; 77965 male [96.3%] and 2995 female [3.7%]) were included. The cohort had high rates of diabetes (16060 patients [20.0%]), congestive heart failure (22516 patients [28.1%]), and chronic lung disease (27682 patients [34.2%]), and 1-year mortality was 15.9% (12876 patients).

Overall, patients with SBP between 130 and 139 mm Hg had the most favorable risk level for mortality and readmission. There were clear, time-dependent mediations on associations in all groups. Compared with patients with SBP of 160 mm Hg or greater, the risk of mortality for patients with SBP between 130 and 139 mm Hg decreased between 60 days (adjusted HR, 1.20; 99% CI, 1.00-1.44) and 365 days (adjusted HR, 0.58; 99% CI, 0.45-0.76). SBP less than 120 mm Hg was associated with increased risk of mortality at all time points. Conclusions and Relevance: In this retrospective cohort study of post-AKI patients, there were important time-dependent mediations of the association of blood pressure with mortality and readmission. These findings may inform timing of post-AKI blood pressure treatment.

12. Risk Factors and Prognosis of Acute Kidney Injury in Hospitalised Sepsis Patients.

Authors: Hou, Lin;Wu, Xue and Sun, Ziguo

Publication Date: Apr ,2024

Journal: Archivos Espanoles De Urologia 77(3), pp. 263-269

Abstract: OBJECT: This study aimed to analyse the risk factors and prognosis of sepsis complicated with acute kidney injury (AKI). METHODS: The clinical data of 324 patients with sepsis in the nephrology department of our hospital from January 2022 to January 2023 were collected. A total of 188 patients with AKI were the occurrence group, and 136 patients without AKI were the non-occurrence group. The influencing factors and prognosis of sepsis complicated with AKI were analysed. RESULTS: We observed significant differences in Acute Physiology and Chronic Health Evaluation II (APACHE II), total length of hospital stay, Intensive Care Unit (ICU) stay, mechanical ventilation support, diabetes mellitus and urine volume >1500 mL between the two groups (p < 0.05). Serum creatinine and non-continuous renal replacement therapy were independent risk factors of sepsis complicated with AKI (p < 0.05). CONCLUSIONS: SOFA, APACHE II, ICU admission days, mechanical ventilation support, serum creatinine and non-continuous renal replacement therapy may be the influencing factors leading to death in patients with sepsis complicated with AKI. Early clinical intervention should be performed. Copyright © 2024 The Author(s).

13. Relationship between nephrotoxicity and area under the concentration-time curve of vancomycin in critically ill patients: a multicenter retrospective study.

Authors: Ishigo, T.;Matsumoto, K.;Yoshida, H.;Tanaka, H.;Ibe, Y.;Fujii, S.;Fukudo, M.;Fujihara, H.;Yamaguchi, F.;Ebihara, F.;Maruyama, T.;Hamada, Y.;Samura, M.;Nagumoi, F.;Komatsu, T.;Tomizawa, A.;Takuma, A.;Chiba, H.;Nishi, Y.;Enoki, Y., et al

Publication Date: 2024

Journal: Microbiology Spectrum , pp. e0373923

Abstract: We aimed to assess the frequency of acute kidney injury (AKI) in different areas under the concentration-time curve (AUC) values of vancomycin (VAN) using a two-point blood collection method, allowing for accurate AUC assessment in critically ill patients. This multicenter retrospective observational study was conducted in eight hospitals. We retrospectively analyzed the data of patients who had received VAN in an intensive care unit (ICU) between January 2020 and December 2022. The primary outcome was the incidence of AKI. Patients were classified into three groups according to the AUC_{24-48h} at the initial therapeutic drug monitoring (TDM) as follows: <600 microg.h/mL. The AUC_{24-48h} values were calculated using the Bayesian estimation software Practical AUC-guided TDM. Among 146 patients [median age (interquartile range), 67 (56-78) years; 39% women], the AUC_{24-48h} <600 microg.h/mL had an AKI rate of 42.9% (6/14). In multivariate Cox proportional hazard analysis, the AUC_{24-48h} 500-600 microg.h/mL [hazard ratio 5.4, 95% confidence interval (CI) 1.64-17.63] and the AUC_{24-48h} ≥600 microg.h/mL (hazard ratio 7.0, 95% CI 2.31-21.18) significantly correlated with a higher incidence of AKI compared with the AUC_{24-48h} <500 microg.h/mL. In conclusion, we identified an association between AUC on day 2 and the risk of AKI in ICU patients, suggesting that not only AUCs

above 600 microg.h/mL but also those between 500 and 600 microg.h/mL pose a risk for AKI. **IMPORTANCE:** Vancomycin (VAN) is a glycopeptide antibiotic and one of the most commonly used antibiotics for severe infections caused by methicillin-resistant *Staphylococcus aureus*. However, higher VAN concentrations have been associated with an increased risk of acute kidney injury (AKI). Herein, we aimed to assess the frequency of AKI in different areas under the concentration-time curve (AUC) values of VAN using a two-point blood collection method, allowing for accurate AUC assessment in critically ill patients. We identified an association between AUC on day 2 and the risk of AKI in intensive care unit patients, suggesting that not only AUCs above 600 microg.h/mL but also those between 500 and 600 microg.h/mL pose a risk for AKI. Therefore, individualized dosing is feasible, with pharmacists being able to optimize VAN doses to attain appropriate targets.

14. Acute kidney injury after out-of-hospital cardiac arrest.

Authors: Jeppesen, Karoline Korsholm;Rasmussen, Sebastian Buhl;Kjaergaard, Jesper;Schmidt, Henrik;Molstrom, Simon;Beske, Rasmus Paulin;Grand, Johannes;Ravn, Hanne Berg;Winther-Jensen, Matilde;Meyer, Martin Abild Stengaard;Hassager, Christian and Moller, Jacob Eifer

Publication Date: 05 18 ,2024

Journal: Critical Care (London, England) 28(1), pp. 169

Abstract: **BACKGROUND:** Acute kidney injury (AKI) is a significant risk factor associated with reduced survival following out-of-hospital cardiac arrest (OHCA). Whether the severity of AKI simply serves as a surrogate measure of worse peri-arrest conditions, or represents an additional risk to long-term survival remains unclear. **METHODS:** This is a sub-study derived from a randomized trial in which 789 comatose adult OHCA patients with presumed cardiac cause and sustained return of spontaneous circulation (ROSC) were enrolled. Patients without prior dialysis dependent kidney disease and surviving at least 48 h were included (N = 759). AKI was defined by the kidney disease: improving global outcome (KDIGO) classification, and patients were divided into groups based on the development of AKI and the need for continuous kidney replacement therapy (CKRT), thus establishing three groups of patients-No AKI, AKI no CKRT, and AKI CKRT. Primary outcome was overall survival within 365 days after OHCA according to AKI group. Adjusted Cox proportional hazard models were used to assess overall survival within 365 days according to the three groups. **RESULTS:** In the whole population, median age was 64 (54-73) years, 80% male, 90% of patients presented with shockable rhythm, and time to ROSC was median 18 (12-26) min. A total of 254 (33.5%) patients developed AKI according to the KDIGO definition, with 77 requiring CKRT and 177 without need for CKRT. AKI CKRT patients had longer time-to-ROSC and worse metabolic derangement at hospital admission. Overall survival within 365 days from OHCA decreased with the severity of kidney injury. Adjusted Cox regression analysis found that AKI, both with and without CKRT, was significantly associated with reduced overall survival up until 365 days, with comparable hazard ratios relative to no AKI (HR 1.75, 95% CI 1.13-2.70 vs. HR 1.76, 95% CI 1.30-2.39). **CONCLUSIONS:** In comatose patients who had been resuscitated after OHCA, patients developing AKI, with or without initiation of CKRT, had a worse 1-year overall survival compared to non-AKI patients. This association remains statistically significant after adjusting for other peri-arrest risk factors. **TRIAL REGISTRATION:** The BOX trial is registered at ClinicalTrials.gov: NCT03141099. Copyright © 2024. The Author(s).

15. COVID-19-associated acute renal failure in critically ill patients correlates with microthrombosis and renal loss of thrombomodulin.

Authors: Koskinen, M.;Englund, E.;Korkut, G. G.;Schwarz, A. and Jeansson, M.

Publication Date: 2024

Journal: medRxiv (pagination), pp. Date of Publication: 19 Mar 2024

Abstract: Critically ill COVID-19 patients have a high degree of acute kidney injury which develops in up to 85% of patients. We have previously shown that circulating levels of angiotensin-2 increased in

critically ill COVID-19 patients correlated to kidney injury, coagulopathy, and mortality. Furthermore, our experiments showed a causal effect on coagulopathy from angiotensin-2 binding and inhibition of thrombomodulin mediated anticoagulation. In the current study we hypothesize that renal microthrombi may be a mechanism for reduced renal function in critically ill COVID-19 patients, and that local dysregulation of thrombomodulin and angiotensin-2 may be involved. To investigate our hypothesis, we utilized postmortem kidney tissue from seven COVID-19 patients treated at the intensive care unit. We evaluated kidney function, thrombosis, tubular injury, fibrosis, glomerulosclerosis, glomerular size as well as renal expression of thrombomodulin and angiotensin-2. Proximity ligation assay was utilized to evaluate the presence of angiotensin-2 binding to thrombomodulin. Normal kidney tissue came from the healthy part of six nephrectomies due to cancer. Our experiments show renal thrombosis in 6/7 COVID-19 patients, on average 14.7 (6.9-22.5) thrombi per mm². Most COVID-19 kidneys had extensive kidney injury, especially tubular necrosis, but also glomerular enlargement, glomerulosclerosis, and tubulointerstitial fibrosis which in some cases most likely resulted from underlying disease. Thrombomodulin expression was reduced in glomeruli and peritubular capillaries in kidneys from COVID-19 patients, whereas no change was found for angiotensin-2. In summary, our study describes a high degree of acute renal failure, renal microthrombosis, and loss of thrombomodulin in postmortem tissue from critically ill COVID-19 patients. Copyright The copyright holder for this preprint is the author/funder, who has granted medRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY-NC-ND 4.0 International license.

16. Clinical and Biochemical Characteristics of COVID-19-Associated Acute Kidney Injury (COVAKI): A Proof-of-Concept Case-Control Study.

Authors: Kumthekar, Girish V.;Nagarkar, Manasi S.;Purandare, Veena;Shukla, Sharvari and Yeravdekar, Rajiv

Publication Date: Apr ,2024

Journal: Cureus 16(4), pp. e57763

Abstract: Introduction Acute kidney injury (AKI) develops in 20-70% of patients with COVID-19. AKI is a syndromic diagnosis with multiple causes and outcomes. This cross-sectional study explored different outcomes of AKI in patients admitted with COVID-19. Material and methods It was a cross-sectional and descriptive study carried out in a tertiary care teaching hospital in Western Maharashtra for two months (May to June 2020). We collected clinical and laboratory data of 456 inpatients admitted with COVID-19 over two consecutive months. We excluded patients already on dialysis upon arrival at the hospital. It predominantly consists of patients who developed AKI during their stay in the hospital. Result C-reactive protein (CRP) was elevated in patients with COVID-19 associated with AKI (COVAKI) (78.87) but was statistically significant (p Copyright © 2024, Kumthekar et al.

17. Factors associated with acute kidney injury in patients undergoing transcatheter aortic valve implantation: Short-term outcomes and impact of right heart failure.

Authors: Kutsal, Dilek Aslan and Terzi, Sait

Publication Date: 2024

Journal: Northern Clinics of Istanbul 11(2), pp. 133-139

Abstract: OBJECTIVE: Transcatheter aortic valve implantation (TAVI) was developed as an alternative to surgery for symptomatic, high-risk patients with severe aortic stenosis (AS). Acute kidney injury, a major complication of TAVI, is associated with a poor prognosis. In our study, we planned to investigate the effect of right heart failure on the development of acute kidney injury after TAVI and other factors contributing to the development of AKI. METHODS: Between January 2015 and December 2020, 198 patients who underwent TAVI due to severe symptomatic aortic stenosis at Dr. Siyami Ersek Cardiovascular Surgery Hospital were screened. Local ethics committee approval was obtained (HNEAH-KAEK 2021/134-3343). Transthoracic echocardiographic findings and laboratory evaluations

were recorded. Patients were evaluated according to Acute Kidney Injury Network (AKIN) criteria. RESULTS: The rate of AKI after TAVI was found to be 41.9%. The mean age of patients who developed AKI was higher (80.90+/-6.8). AKI development rates were higher in the female gender (68.7%) and patients with hypertension (44.8%). It was observed that the risk of developing AKI was higher in patients who underwent TAVI and developed AKI afterwards, especially in patients with stage-3 and stage-4 advanced CKD before TAVI (p: The rate of AKI after TAVI was found to be 41.9%. The mean age of patients who developed AKI was higher (80.90+/-6.8). AKI development rates were higher in the female gender (68.7%) and patients with hypertension (44.8%). It was observed that the risk of developing AKI was higher in patients who underwent TAVI and developed AKI afterwards, especially in patients with stage-3 and stage-4 advanced CKD before TAVI (pCONCLUSION: We observed that chronic kidney disease before TAVI, advanced age, and female gender are important determinants of the development of AKI after TAVI. Although a relationship between TAVI and right heart failure has not been demonstrated, large-scale studies are needed in the future. © Copyright 2024 by Istanbul Provincial Directorate of Health.

18. Elevated Activated Partial Thromboplastin Time as a Predictor of 28-Day Mortality in Sepsis-Associated Acute Kidney Injury: A Retrospective Cohort Analysis.

Authors: Lin, Chen;Wang, Jing;Cai, Kexin;Luo, Yuqing;Wu, Wensi;Lin, Siming;Lin, Zhihong and Feng, Shaodan

Publication Date: 2024

Journal: International Journal of General Medicine 17, pp. 1739-1753

Abstract: Purpose: To address the critical mortality rates among sepsis-associated acute kidney injury (SA-AKI) patients, early prognosis is vital. This study investigates the relationship between coagulation indices and the 28-day mortality rate in patients with SA-AKI. Patients and Methods: This study was a retrospective cohort analysis including patients with SA-AKI admitted to the First Hospital of Fujian Medical University as a training cohort (n = 119) and patients admitted to the Third People's Hospital of Fujian University of Traditional Chinese Medicine as a validation cohort (n = 51). We examined the relationship between coagulation indices and 28-day mortality in SA-AKI, the cumulative mortality at different activated partial thromboplastin time (APTT) levels, and the nonlinear relationship between APTT and 28-day mortality. Receiver operating characteristic curves were plotted, and the area under the curve was calculated to assess the predictive power of APTT. Finally, subgroup analyses were performed to assess the robustness of the association. Results: Overall, 119 participants with a mean+/-standard deviation age of 70.47+/-15.20 years were included in the training cohort: 54 died, 65 survived. According to univariate and multivariate COX regression analyses, APACHE II score, CRP level, Lac level, and APTT level were independent risk factors for 28-day adverse prognosis. After controlling for some variables, an elevated baseline APTT (≥ 37.7 s) was associated with an elevated risk of 28-day mortality (HR, 1.017; 95% CI, 1.001-1.032), and Kaplan-Meier analyses further confirmed the increased mortality in the group with a higher APTT. The same results were shown when the validation cohort was analyzed (HR, 1.024; 95% CI, 0.958-1.096). Subgroup analyses showed the stability of the association between APTT and poor prognosis in SA-AKI. Conclusion: In essence, APTT elevation is synonymous with increased 28-day mortality rates, indicating a poor prognosis in SA-AKI scenarios. Copyright © 2024 Lin et al.

19. Multiple adverse outcomes associated with antipsychotic use in people with dementia: population based matched cohort study.

Authors: Mok, P. L. H.;Carr, M. J.;Guthrie, B.;Morales, D. R.;Sheikh, A.;Elliott, R. A.;Camacho, E. M.;Van Staa, T.;Avery, A. J. and Ashcroft, D. M.

Publication Date: 2024

Journal: BMJ (pagination)

Abstract: Objective: To investigate risks of multiple adverse outcomes associated with use of antipsychotics in people with dementia. Design(s): Population based matched cohort study. Setting(s): Linked primary care, hospital and mortality data from Clinical Practice Research Datalink (CPRD), England. Population: Adults (≥ 50 years) with a diagnosis of dementia between 1 January 1998 and 31 May 2018 ($n=173\,910$, 63.0% women). Each new antipsychotic user ($n=35\,339$, 62.5% women) was matched with up to 15 non-users using incidence density sampling. Main Outcome Measure(s): The main outcomes were stroke, venous thromboembolism, myocardial infarction, heart failure, ventricular arrhythmia, fracture, pneumonia, and acute kidney injury, stratified by periods of antipsychotic use, with absolute risks calculated using cumulative incidence in antipsychotic users versus matched comparators. An unrelated (negative control) outcome of appendicitis and cholecystitis combined was also investigated to detect potential unmeasured confounding. Result(s): Compared with non-use, any antipsychotic use was associated with increased risks of all outcomes, except ventricular arrhythmia. Current use (90 days after a prescription) was associated with elevated risks of pneumonia (hazard ratio 2.19, 95% confidence interval (CI) 2.10 to 2.28), acute kidney injury (1.72, 1.61 to 1.84), venous thromboembolism (1.62, 1.46 to 1.80), stroke (1.61, 1.52 to 1.71), fracture (1.43, 1.35 to 1.52), myocardial infarction (1.28, 1.15 to 1.42), and heart failure (1.27, 1.18 to 1.37). No increased risks were observed for the negative control outcome (appendicitis and cholecystitis). In the 90 days after drug initiation, the cumulative incidence of pneumonia among antipsychotic users was 4.48% (4.26% to 4.71%) versus 1.49% (1.45% to 1.53%) in the matched cohort of non-users (difference 2.99%, 95% CI 2.77% to 3.22%). Conclusion(s): Antipsychotic use compared with non-use in adults with dementia was associated with increased risks of stroke, venous thromboembolism, myocardial infarction, heart failure, fracture, pneumonia, and acute kidney injury, but not ventricular arrhythmia. The range of adverse outcomes was wider than previously highlighted in regulatory alerts, with the highest risks soon after initiation of treatment. Copyright © Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY. No commercial re-use. See rights and permissions. Published by BMJ.

20. Preoperative fasting glucose value can predict acute kidney injury in non-cardiac surgical patients without diabetes but not in patients with diabetes.

Authors: Pang, Qianyun;Feng, Yumei;Yang, Yajun and Liu, Hongliang

Publication Date: May 13 ,2024

Journal: Perioperative Medicine 13(1), pp. 39

Abstract: BACKGROUND: Postoperative acute kidney injury (AKI) is a common and costly complication after non-cardiac surgery. Patients with or without diabetes could develop hyperglycemia before surgery, and preoperative hyperglycemia was closely associated with postoperative poor outcomes, but the association between preoperative fasting blood glucose level and postoperative AKI is still unclear. METHODS: Data from patients undergoing non-cardiac surgery in Chongqing University Cancer Hospital from January 1, 2017, to May 31, 2023, were collected, preoperative glucose value and perioperative variables were extracted, the primary exposure of interest was preoperative glucose value, and the outcome was postoperative AKI. RESULTS: Data from 39,986 patients were included in the final analysis, 741(1.9%) patients developed AKI, 134(5.6%) in the cohort with DM, and 607(1.6%) in the cohort without DM(OR 1.312, 95% CI 1.028-1.675, $P = 0.029$). A significant non-linear association between preoperative glucose and AKI exists in the cohort without DM after covariable adjustment ($P = 0.000$), and every 1 mmol/L increment of preoperative glucose level increased OR by 15% (adjusted OR 1.150, 95% CI 1.078-1.227, $P = 0.000$), the optimal cut-point of preoperative fasting glucose level to predict AKI was 5.39 mmol/L (adjusted OR 1.802, 95%CI 1.513-2.146, $P = 0.000$). However, in the cohort with DM, the relation between preoperative glucose and postoperative AKI was not significant after adjusting by covariables ($P = 0.437$). No significance exists between both cohorts in the risk of AKI over the range of preoperative glucose values. CONCLUSION: A preoperative fasting glucose value of 5.39 mmol/L can predict postoperative acute kidney injury after non-cardiac surgery in patients without diagnosed diabetes, but it is not related to AKI in patients with the diagnosis. Copyright © 2024. The Author(s).

21. Influence of acute kidney injury and its recovery subtypes on patient-centered outcomes after lung transplantation.

Authors: Park, Jin Ha;Shim, Jae-Kwang;Choi, Mingee;Zhang, Hyun-Soo;Jun, Na Hyung;Choi, Seokyeong and Kwak, Young-Lan

Publication Date: 05 07 ,2024

Journal: Scientific Reports 14(1), pp. 10480

Abstract: This study aimed to investigate the association between acute kidney injury (AKI) recovery subtypes and days alive out of hospital within the first 3 months (DAOH-90) in patients undergoing lung transplantation. Patients who underwent lung transplantation from January 2012 to December 2021 were retrospectively analyzed and stratified into three groups: no-AKI, early recovery AKI (within 7 days), and non-early recovery AKI group. AKI occurred in 86 (35%) of patients, of which 40 (16%) achieved early recovery, and the remaining 46 (19%) did not. The median DAOH-90 was 21 days shorter in the AKI than in the no-AKI ($P = 0.002$), and 29 days shorter in the non-early recovery AKI group than in the no-AKI group (P Copyright © 2024. The Author(s).

22. Periods of low renal perfusion pressure are associated with acute kidney injury following paediatric cardiac surgery.

Authors: Penk, J. S.;Gist, K. M.;Barhight, M.;Migally, K.;Borasino, S.;Torres, W. F.;Dong, S.;Marino, B. S. and Krawczeski, C. D.

Publication Date: 2024

Journal: Cardiology in the Young (pagination), pp. Date of Publication: 2024

Abstract: Introduction: Acute kidney injury is associated with worse outcomes after cardiac surgery. The haemodynamic goals to ameliorate kidney injury are not clear. Low post-operative renal perfusion pressure has been associated with acute kidney injury in adults. Inadequate oxygen delivery may also cause kidney injury. This study evaluates pressure and oximetric haemodynamics after paediatric cardiac surgery and their association with acute kidney injury. Material(s) and Method(s): Retrospective case-control study at a children's hospital. Patients were = 3. Low renal perfusion pressure was time and depth below several tested thresholds. The primary outcome was serum creatine-defined acute kidney injury in the first 7 days. Result(s): Sixty-six patients (median age 8 days) were included. Acute kidney injury occurred in 36%. The time and depth of renal perfusion pressure Result(s): Sixty-six patients (median age 8 days) were included. Acute kidney injury occurred in 36%. The time and depth of renal perfusion pressure Result(s): Sixty-six patients (median age 8 days) were included. Acute kidney injury occurred in 36%. The time and depth of renal perfusion pressure Conclusion(s): Periods of low renal perfusion pressure (Conclusion(s): Periods of low renal perfusion pressure (Copyright © The Author(s), 2024. Published by Cambridge University Press.

23. Machine learning derived serum creatinine trajectories in acute kidney injury in critically ill patients with sepsis.

Authors: Takkavatakarn, Kullaya;Oh, Wonsuk;Chan, Lili;Hofer, Ira;Shawwa, Khaled;Kraft, Monica;Shah, Neomi;Kohli-Seth, Roopa;Nadkarni, Girish N. and Sakhuja, Ankit

Publication Date: 05 10 ,2024

Journal: Critical Care (London, England) 28(1), pp. 156

Abstract: BACKGROUND: Current classification for acute kidney injury (AKI) in critically ill patients with sepsis relies only on its severity-measured by maximum creatinine which overlooks inherent

complexities and longitudinal evaluation of this heterogenous syndrome. The role of classification of AKI based on early creatinine trajectories is unclear. **METHODS:** This retrospective study identified patients with Sepsis-3 who developed AKI within 48-h of intensive care unit admission using Medical Information Mart for Intensive Care-IV database. We used latent class mixed modelling to identify early creatinine trajectory-based classes of AKI in critically ill patients with sepsis. Our primary outcome was development of acute kidney disease (AKD). Secondary outcomes were composite of AKD or all-cause in-hospital mortality by day 7, and AKD or all-cause in-hospital mortality by hospital discharge. We used multivariable regression to assess impact of creatinine trajectory-based classification on outcomes, and eICU database for external validation. **RESULTS:** Among 4197 patients with AKI in critically ill patients with sepsis, we identified eight creatinine trajectory-based classes with distinct characteristics. Compared to the class with transient AKI, the class that showed severe AKI with mild improvement but persistence had highest adjusted risks for developing AKD (OR 5.16; 95% CI 2.87-9.24) and composite 7-day outcome (HR 4.51; 95% CI 2.69-7.56). The class that demonstrated late mild AKI with persistence and worsening had highest risks for developing composite hospital discharge outcome (HR 2.04; 95% CI 1.41-2.94). These associations were similar on external validation. **CONCLUSIONS:** These 8 classes of AKI in critically ill patients with sepsis, stratified by early creatinine trajectories, were good predictors for key outcomes in patients with AKI in critically ill patients with sepsis independent of their AKI staging. Copyright © 2024. The Author(s).

24. Forecasting Acute Kidney Injury and Resource Utilization in ICU patients using longitudinal, multimodal models.

Authors: Tan, Y.;Dede, M.;Mohanty, V.;Dou, J.;Hill, H.;Bernstam, E. and Chen, K.

Publication Date: 2024

Journal: medRxiv (pagination), pp. Date of Publication: 15 Mar 2024

Abstract: Background: Advances in artificial intelligence (AI) have realized the potential of revolutionizing healthcare, such as predicting disease progression via longitudinal inspection of Electronic Health Records (EHRs) and lab tests from patients admitted to Intensive Care Units (ICU). Although substantial literature exists addressing broad subjects, including the prediction of mortality, length-of-stay, and readmission, studies focusing on forecasting Acute Kidney Injury (AKI), specifically dialysis anticipation like Continuous Renal Replacement Therapy (CRRT) are scarce. The technicality of how to implement AI remains elusive. Objective(s): This study aims to elucidate the important factors and methods that are required to develop effective predictive models of AKI and CRRT for patients admitted to ICU, using EHRs in the Medical Information Mart for Intensive Care (MIMIC) database. Method(s): We conducted a comprehensive comparative analysis of established predictive models, considering both time-series measurements and clinical notes from MIMIC-IV databases. Subsequently, we proposed a novel multi-modal model which integrates embeddings of top-performing unimodal models, including Long Short-Term Memory (LSTM) and BioMedBERT, and leverages both unstructured clinical notes and structured time series measurements derived from EHRs to enable the early prediction of AKI and CRRT. Result(s): Our multimodal model achieved a lead time of at least 12 hours ahead of clinical manifestation, with an Area Under the Receiver Operating Characteristic Curve (AUROC) of 0.888 for AKI and 0.997 for CRRT, as well as an Area Under the Precision Recall Curve (AUPRC) of 0.727 for AKI and 0.840 for CRRT, respectively, which significantly outperformed the baseline models. Additionally, we performed a SHapley Additive exPlanation (SHAP) analysis using the expected gradients algorithm, which highlighted important, previously underappreciated predictive features for AKI and CRRT. Conclusion(s): Our study revealed the importance and the technicality of applying longitudinal, multimodal modeling to improve early prediction of AKI and CRRT, offering insights for timely interventions. The performance and interpretability of our model indicate its potential for further assessment towards clinical applications, to ultimately optimize AKI management and enhance patient outcomes. Copyright The copyright holder for this preprint is the author/funder, who has granted medRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY-NC-ND 4.0 International license.

25. Urinary L-FABP as an Early Biomarker for Pediatric Acute Kidney Injury Following Cardiac

Surgery with Cardiopulmonary Bypass: A Systematic Review and Meta-Analysis

Authors: Wilnes, Bruno;Castello-Branco, Beatriz;Branco, Barbara Castello;Sanglard, Andre;Vaz de Castro, Pedro Alves Soares and Simoes-E-Silva, Ana Cristina

Publication Date: Apr 30 ,2024

Journal: International Journal of Molecular Sciences 25(9)

Abstract: Acute kidney injury (AKI) following surgery with cardiopulmonary bypass (CPB-AKI) is common in pediatrics. Urinary liver-type fatty acid binding protein (uL-FABP) increases in some kidney diseases and may indicate CPB-AKI earlier than current methods. The aim of this systematic review with meta-analysis was to evaluate the potential role of uL-FABP in the early diagnosis and prediction of CPB-AKI. Databases Pubmed/MEDLINE, Scopus, and Web of Science were searched on 12 November 2023, using the MeSH terms "Children", "CPB", "L-FABP", and "Acute Kidney Injury". Included papers were revised. AUC values from similar studies were pooled by meta-analysis, performed using random- and fixed-effect models, with $p = 0.036$), postoperative serum creatinine ($r = 0.567$, $p < 0.0001$). Importantly, uL-FABP at baseline (AUC = 0.77, 95% CI: 0.64-0.89, $n = 365$), 2 h (AUC = 0.71, 95% CI: 0.52-0.90, $n = 509$), and 6 h (AUC = 0.76, 95% CI: 0.72-0.80, $n = 509$) diagnosed CPB-AKI earlier. Hence, higher uL-FABP levels associate with worse clinical parameters and may diagnose and predict CPB-AKI earlier.

26. Predictive value of serum myoglobin and lactate dehydrogenase in rhabdomyolysis-induced acute kidney injury from severe heatstroke.

Authors: Yin, Xiaoyan and Wang, Wei

Publication Date: 2024

Journal: American Journal of Translational Research 16(4), pp. 1477-1483

Abstract: OBJECTIVE: To explore the predictive utility of serum myoglobin (Mb) and lactate dehydrogenase (LDH) for acute kidney injury (AKI) secondary to rhabdomyolysis (RM) in severe heatstroke patients. METHODS: A retrospective analysis of 58 RM patients with severe heatstroke at Shanghai Ninth People's Hospital from June 2019 to May 2022 was conducted. Patients were categorized into AKI and non-AKI groups. Laboratory indices were compared, and receiver operating characteristic (ROC) curves were used to assess the predictive value of serum biomarkers for AKI. RESULTS: Creatine kinase, Mb, LDH, creatinine, and blood urea nitrogen levels were significantly higher in the AKI group (P: Creatine kinase, Mb, LDH, creatinine, and blood urea nitrogen levels were significantly higher in the AKI group (P: Creatine kinase, Mb, LDH, creatinine, and blood urea nitrogen levels were significantly higher in the AKI group (P: Creatine kinase, Mb, LDH, creatinine, and blood urea nitrogen levels were significantly higher in the AKI group (P: CONCLUSION: Serum Mb and LDH levels are elevated in RM-induced AKI following severe heatstroke, and their combination offers substantial predictive value for AKI in these patients. AJTR Copyright © 2024.

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